EXHIBIT 10

BenchMark™ XT/Discovery™ XT/BenchMark LT Service Manual

BenchMark™ XT/Discovery™ XT/ BenchMark LT Service Manual

This manual's Part Number is 2000300 Revision B.

2.0 WHAT BENCHMARK XT/ DISCOVERY XT/ BENCHMARK LT DOES

2.1 Tissue Staining

The BenchMark XT/Discovery XT/BenchMark LT instrument automates an exacting and somewhat tedious laboratory procedure used to produce visible *stains* on biological tissue samples.

- These stained tissue samples (on glass slides) are used by a pathologist to diagnose various diseases
- The chemistries involved are called immunohistochemistry (IHC) or *in situ* hybridization (ISH)

2.2 Tissue Staining Process

A multi-step process is needed to produce a stain. In each step, a chemical called a *reagent* is applied to the tissue sample.

- The reagent and the tissue sample undergo a biochemical reaction
  - The biochemical reaction must be allowed to occur over a specified amount of time
  - The biochemical reaction must be allowed to occur at a precisely controlled temperature
- The process is then repeated with another reagent, which requires yet another reaction time
- A number of steps spaced over one to four hours is usually required to produce the desired stain

The BenchMark XT/Discovery XT instrument allows up to 30 slides to be loaded and stained in a single run, while the BenchMark LT instrument allows up to 20 slides to be loaded and stained in a single run. All three instruments can use up to 35 different reagents. A laboratory technician can specify the stain needed for each slide, load the reagents, then start the instrument and simply walk away until all of the stains have been completed.

- This is called ***bar code blow-off***
  - Liquid on the bar code label prevents the bar code reader from reading
- Create an LCS puddle separated from the bar code label
  - A jet of air called an ***air knife*** keeps the puddle from leaking or wicking into the bar code label
    - Once separated, the edge of the bar code label will act as a dam, forcing the puddle to remain intact on the slide like a drop of water on a window

- **DISPENSING**—The specified reagent (identified by its bar code label) is dispensed into the puddle created in the previous steps
  - The LCS solution floats to the top, again covering the solution, which is now a mixture of buffer and reagent
- **MIXING**—The instrument uses ***vortex mixers*** (air streams) to mix the solution and distribute it over the tissue sample on the slide
  - The mixing action is performed several times
  - The mixing action helps the biochemical reaction
  - The mixing action ensures that the reagents come into contact with the entire tissue sample on the slide

Temperature is an important ingredient in the process.

- BenchMark XT/Discovery XT/BenchMark LT has slide ThermoPads™ to control the temperature of individual slides so that the chemical reactions will occur under optimum conditions

During a *run* of the instrument, the six step sequence above is repeated according to the protocol specified for *each* slide.

- Reagent selection and the time between dispense steps are part of the protocol for a given slide
- Each slide the BenchMark XT/Discovery XT/ BenchMark LT instrument can hold may have a separate protocol, or all may have the same protocol
- BenchMark XT/Discovery XT/BenchMark LT obviously saves a lot of laboratory manpower and potential for error compared to doing it all by hand

3.0 MAJOR SYSTEM MODULES

BenchMark XT/Discovery XT/BenchMark LT is comprised of four major modules:

- The stainer subassembly
- The automated fluidics subassembly
- The waste subassembly
- The personal computer

3.1 Stainer Subassembly

This subassembly is where the chemistry is performed.

- The BenchMark XT and Discovery XT can hold up to 30 slides
- The BenchMark LT can hold up to 20 slides
  - Each of the slide positions has a fixed integrated slide holder and ThermoPad
- It has a rotating nozzle plate that is rotated by a stepper motor
  - The rotary position of the nozzle plate is relative to a home position obtained from a sensor
  - The nozzle plate incorporates
    - A slide bar code reader
    - A variety of valves and nozzles for dispensing and removing fluids
- It has a reagent carousel with spaces for 35 reagent dispensers
  - The reagent carousel is rotated by a stepper motor
    - The rotary position of the reagent carousel is relative to a home position obtained from a sensor
  - Reagents are dispensed from disposable containers that snap into the ***dispenser plate*** on the lower part of the reagent carousel
    - To dispense a reagent, BenchMark XT/Discovery XT/BenchMark LT rotates the reagent into position below a plunger which presses down on a syringe built into the container

- Reagent Dispensers
- Bar Code Readers
- Liquid and Air Nozzles
  - Nozzle Arrangement
  - Dual Rinse Nozzles
  - Jet Drain Nozzle
  - Multispense Nozzles
  - LCS Nozzles
  - Air Knife Nozzle
  - Vortex Mixer Nozzles
- Restrictors and Filters
- Fan and Sensor
- Slide Tray Sensor
- Tub and Overflow Sensor
- Instrument Control Panel
- Power Supply
- Cables and Wiring Harnesses
- Plumbing

4.1 Reagent Carousel and Nozzle Plate

BenchMark XT/Discovery XT/BenchMark LT uses a rotating carousel to carry reagent dispensers. It also uses a rotating nozzle plate for dispensing and removing fluids, and reading slide bar codes.

4.1.1 Reagent Carousel

The carousel is able to rotate either clockwise or counterclockwise.

- The reagent carousel is rotated by a power transmission assembly
  - It is positioned by a stepper motor through a belt drive and sprockets

A dispenser plate holds the reagent dispensers.

- The microcontroller is able to operate the stepper in either a low-torque or a high-torque mode

Staining Module

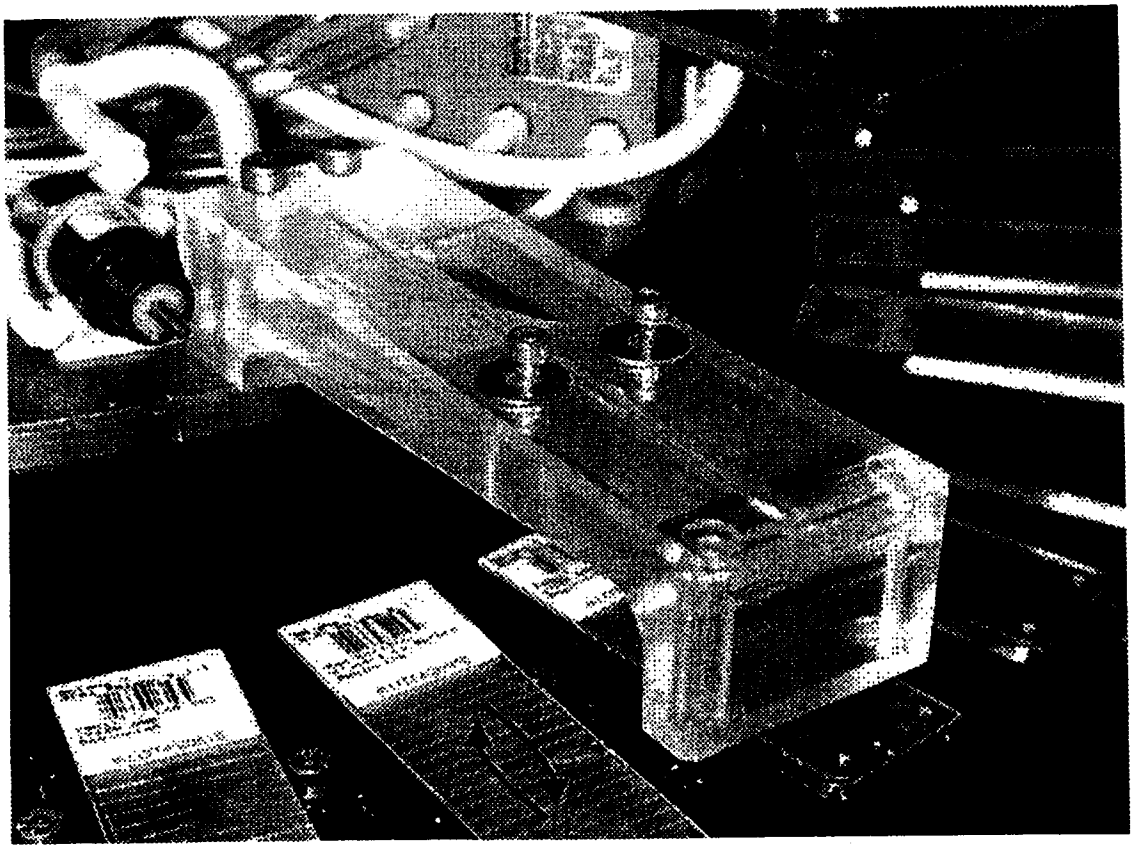

Figure 14. Outer Mixer

- The inner and outer vortex mixers create a gentle vortex effect over the liquid puddle on the slide
  - As the nozzle plate rotates, the vortex mixers swirl the liquid puddle on the slide clockwise, then counterclockwise at several stations
  - This stirring action
    - Thoroughly mixes the reagents and antibodies
    - Provides uniform wetting of the specimen during incubation